ANTHRAQUINONES OF *CISSUS POPULNEA* GUILL & PERR (AMPLIDACEAE)

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Abstract

Cissus populnea has been used locally to treat many ailments such as venereal, stomach and skin infections; and also used as laxative or purgative. Economically it has been used as binder in food and in lining dye pits. This work aims at determining the type of anthraquinones from the stem bark of *C. populnea* which might be a potential source of drugs (laxative/cathartic) using thin layer chramatograpy (TLC) and senna leaf as reference. The analysis showed the stem bark anthroquinone extract to contain physcion and chrysophanol.

Key words: *Cissus populnea*, stem bark, anthraquinones, TLC.

Introduction

The plant *Cissus populnea Guill & Perr* belongs to the family *Amplidaceae* (*Vitaceae*). The plant is 2 to 3m high semi-climber which grows in the savannah and is widely distributed in Senegal, Sudan, Uganda, Abyssinia and Nigeria (Hutchinson and Dalziel,1958). It is commonly known as 'Okoho' by the Idomas, Igbo and Igala tribes of Nigeria; 'Dafara' (Kano, Zaria); 'latutuwa' (Katsina) by the Hausa language of the indicated towns of northern Nigeria(Gbile, 1980); 'Ajara' or 'Orogbolo' by the Yoruba tribes of northern and southern Nigeria. Economically the fruits are edible in soups. The stem bark is also used in preparation of soup and other foods as bean cake. The roots or stem are used in building (Irvine, 1961). Ethno-medicinal uses include treatment of sore breast, indigestion, venereal diseases, intestinal parasites, oedema and eye problems resulting from attack of black cobra (*Naja nigricollis)* (Irvine, 1961). The plant is also used as cathartic, aphrodisiac and antidote to arrow wounds. The stem bark has been reported to contain carbohydrates, tannins, cyanogenic glycosides, anthraquinones, saponins, cardiac glycosides and flavonoids (Ibrahim, 1990; Ibrahim et al., 1993). This project aims at determining the type of anthraquinones from the stem bark of *C. populnea* which might be a potential source of drugs (laxative/cathartic}.

Experimental

Plant collection and Identification

The stem of *Cissus populnea* were collected in April 1992, in the morning from Tashar Ango, a village 60km along Zaria-Kano road. The plant was identified on the field by description given in the monographs (Irvine, 1961, Hutchinson and Dalziel, 1958). It was then authenticated at the Herbarium, Department of Biological Sciences, Ahmadu Bello University, Zaria. The voucher specimen number given was FHI 102867.

Extraction of Anthraquinones

The powdered stem bark of *C. populnea* (9g) was detanned with acetone by percolation. The absence of tannins was tested with lead subacetate. To the marc was added 100ml of methanol, 6ml of conc. HCl, few drops of $FeCl_3$ and refluxed on a water bath for 30 mins. It was cooled, filtered and 100ml of $CHCl_3$ added to the filtrate. The $CHCl_3$ phase was separated and evaporated to dryness (Figure 1).

The extraction was monitored using Bontrager's test (Brain and Turner, 1975). The powdered leaves of Senna (5g) was extracted as described for *Cissus populnea* (Friedrich and Bailer, 1973; Brain and Turner, 1975).

Thin Layer Chromatography

Thin layer chromatographic plates (10cm by 10cm) were cleaned and coated with silica gel G (0.25mm thick). Ascending chromotography was used with developing solvent petroleum ether (60-80^oC): ethylacetate: acetic acid (45:5:3). The detecting reagent used was 25% nitric acid and heated at 110^oC for 10 mins. The plates were removed from the oven cooled and again sprayed with 5% potassium hydroxide in 50% ethanol (Friedrich and Bailer, 1973). The percentage content of anthraquinones of the stem bark of *Cissus populnea* was determined by gravimetric method.

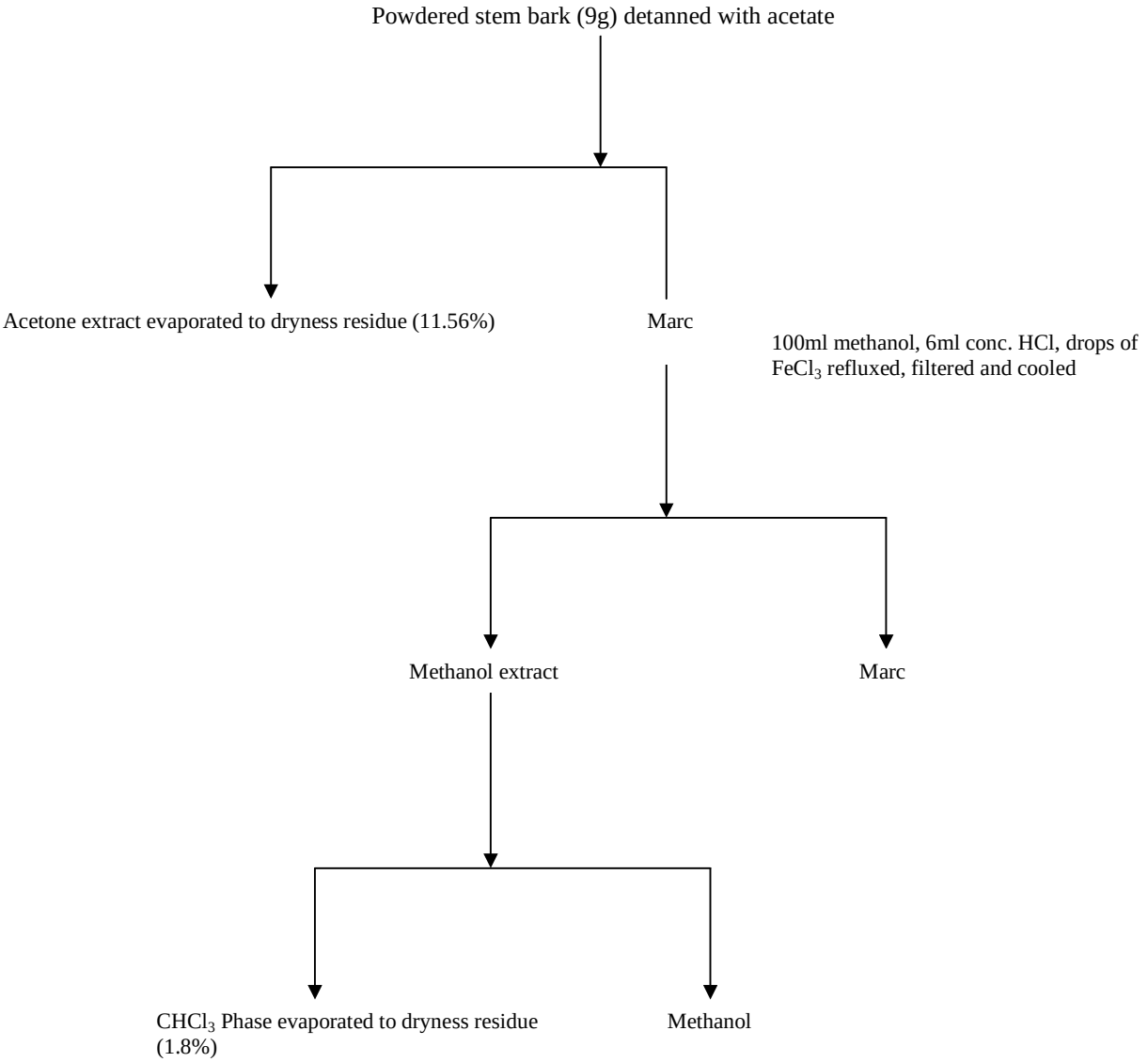

Figure 1: Anthraquinones in *Cissus populnea*

Results

The thin layer chromatographic analysis revealed the anthraquinone extracts to contain physcion and chrysaphanol (Table 1). The percentage content of anthraquinones of the stem bark of *Cissus populnea* is 1.8% w/w (Figure 1). The chromatographic analysis indicated the presence of physcion and chrysaphanol; by their corresponding colours, R_f values (Table 1) and with reference to the chramotographed standard senna and R_f values of senna obtained from the literature (Friedrich and Bailer, 1973).

Table 1: Thin layer chromatographic results of anthraquinone extract of *Cissus populnea stem* bark and Senna leaves.

Reference Anthraquinones of Senna leaf	**Reference Rf (Friedrich and Bailer, 1973)**	**Rf of Experimental anthraquinone of senna leaf**	**Spots colour with 25% nitric acid and 5% KOH in 50% alcohol**	**Rf of anthraquinones of *C. populnea***	**Colour of spots with 25% Nitric acid and 5% KoH in 50% alcohol**
Aloe emodin	18.30	19.92	Pink	22.90	Brown
Rhein	38.30	29.70	Pink	34.10	Brown
Rheinemodin	50.00	51.98	Brown	60.10	Yellow
Physcion	75.00	75.90	Yellow	74.00	Pale yellow
Chrysophanol	83.30	82.6	Yellow	84.00	Pale yellow

Key: R_f retardation factor

Solvent system: petroleum ether: ethylacetate : acetic acid (45:5:3)
Spray reagent: 1.25% nitric acid and at 110^{o}C for 10 mins.
2. cooled plates sprayed with 5% potassium hydroxide

Discussion

Anthraquinones are anthracene derivatives and occur mainly as glycosides. Extraction is based on the fact that the free anthraquinones are soluble in non polar solvents while the glycosides are soluble in polar solvents. Free anthraquinones are obtained on hydrolysis with acids, minerals or enzymes of the glycosides (Evans, 1996; Tyler et al., 1981). This experiment employed hydrochloric acid hydrolysis. Tannins obscure the colour reactions of anthraquinones therefore the stem bark was detanned with acetone before extraction of the glycosides in methanol.

From table 1 the concentration of the two anthraquinones seems to be less than that of senna since the yellow colour intensity is less than that of senna.

The presence of anthraquinones justifies the use of the stem bark in the treatment of indigestion and the chromatographic profile can be used for identification of the plant.

References

1. Brain, K. R. and Turner, T. D. (1975). The Practical Evaluation of Phytopharmaceuticals. Wright Scentechnica. Bristol. Pp 105-106.
2. Evans,W.C.(1996). Trease and Evan's Pharmacognosy. Fourteenth edition. WB Saunders Company Ltd. London. Pp. 233-248.
3. Friedrich H. and Bailer, S. (1973). Investigation of the contents of Senna leaves. Planta medica; **23(1):** 74-87.
4. Gbile Z. (1980). Vernacular Names of Nigeria Plants (Hausa). The Federal Department of Forestry, Lagos. Pp. 8.
5. Hutchinson, J. and Dalziel, J. M. (1958). Flora of West tropical Africa. Second edition, vol. Ii part 2. Crown Agents for Oversea Government and Administration. Millbert. London. Pp 672-683
6. Ibrahim, H. (1990). Pharmacognostic and Evaluation studies of the stem bark of *Cissus populnea* Guill & Perr. *M.Sc thesis*. Ahmadu Bello University, Zaria. Nigeria. Pp 44-46, 108-108, 114
7. Ibrahim, H., Rai, P. P. and Bangudu, A. B. (1993). Pharmacognostic studies of the Stem Bark of Cissus populnea Guill & Perr, Glimpses in Plant Research, vol. **1:** 175-180.
8. Irvine, F. R. (1961). Woody Plants of Ghana, Oxford University Press London. Pp. 486-487.
9. Tyler, V. E., Brady, L. R. and Roberts, J. E.l (1981). Pharmacognosy. Eighth edition. Lea and Febiger. Philadelphia. Pp. 57-67.